

REMARKS

CLAIM INTERPRETATION

The Examiner requests that the definition of a conventional “solder paste” be added to the specification and suggests that a good place for the addition is in the paragraph on page 4, line 15. The Applicant has reviewed the Examiner’s comments and the Original Specification and has amended the Specification according to the Examiner’s suggestion.

35 USC §112

Claims 22-27 are rejected under 35 USC §112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Applicant disagrees, especially in view of the amendments presented herein.

Claim 22 is amended to replace the reference to Teflon® with its commonly known chemical component polytetrafluoroethylene. Claims 23 and 24 are amended to read “the base layer comprises a fine mesh fiber material impregnated with the thermosetting material.” Claim 25 is amended to read “the base layer comprises the thermosetting material intermixed with a particle filler.” The Applicant asserts that these claim amendments moot the Examiner’s rejections and respectfully requests the Examiner to reconsider the amended claims with respect to the rejection as being indefinite.

35 USC 103 (A)

Claims 13-15 and 22-27 are rejected under 35 USC 103(a) as being unpatentable over Chung (US Patent 6,399,178) in view of Calhoun et al. (US Patent 5,275,856) and Wasulko (US Patent 5,049,434). The Applicant respectfully disagrees.

Claim 13 recites “a method for coupling an IC to a supporting surface comprising: a) providing an IC; b) providing a supporting surface to which the IC is to be mechanically and electrically bonded; c) **providing a pre-form assembly comprising a base layer and a sacrificial layer, the base layer comprising a thermosetting material or a thermoplastic material and wire or solder paste through conductors**; d) applying the pre-form assembly to either the IC or supporting surface; e) peeling away the sacrificial layer; f) sandwiching the base layer between the IC and the supporting surface; and g) curing the base layer.”

Chung teaches an electronic device that comprises one or more electronic components, including flip-chip semiconductor devices, chip resistors, capacitors and inductors by using an adhesive underfill bonding between the electronic component and the substrate. However, the rigid adhesive underfill is not a preform that comprises a base layer that comprises a thermosetting material or a thermoplastic material and wire or solder paste through conductors, and as mentioned earlier the rigid adhesive underfill does not have a sacrificial layer with a release coating, as currently recited in claim 13 of the present application. The embodiments in Chang comprise a rigid adhesive underfill with blank vias, whereby the underfill is applied to a substrate already comprising conductors that mate with the underfill. **The underfill does not comprise through conductors before mating with the supporting surface. It is only after the underfill is mated with the surface that the underfill consists of through conductors.** Given that the claims presented in the present application are not apparatus claims but are instead method claims, the Examiner cannot properly use the final product as proof of obviousness. Furthermore, as the Examiner points out in Paper No. 7, page 2 – Chung teaches that an adhesive preform film or sheet of thermosetting adhesive for bonding electronic components is dried or B-staged to facilitate handling and lamination

to a device or substrate. Chung does not teach or suggest to one of ordinary skill in the art – whether alone or in combination with Calhoun - that a pre-form assembly can be prepared comprising a base layer and a sacrificial layer, the base layer comprising a thermosetting material or a thermoplastic material and wire or solder paste through conductors. Chung also does not motivate one of ordinary skill in the art – whether alone or in combination with Calhoun – to prepare a pre-form assembly comprising a base layer and a sacrificial layer, the base layer comprising a thermosetting material or a thermoplastic material and wire or solder paste through conductors.

Calhoun et al. (Calhoun) teaches electrically conductive adhesive tapes comprising at least one carrier web having a low-adhesion face bearing thereon an adhesive layer having substantially uniform thickness, said tape having a plurality of perforations, each perforation containing a plurality of electrically conductive particles in contact with the adhesive layer. Column 3, lines 38-46 further describe the electrically conductive particles as “silver or nickel, metal-coated polymeric particles and graphite”. It is clearly shown in column 3 that the particles are not bound together into a solder paste or are made into a wire, since Calhoun merely mentions using organic binders and clearly does not contemplate a solder paste material. Conventional solder paste formulations comprise a metal or alloy powder, a rosin compound, a rheological additive, a solvent or solvent mixture, a surfactant or surfactant mixture, and/or a buffer or neutralizing agent. One solder paste formulation manufactured by Flip Chip consists of a Tin/Silver/Copper alloy powder, refined gum rosin, 1-phenoxy-2-propanol, Thixatrol ST™, Igepal™ CO-430, 2,2,2-nitrilotriethanol and succinic acid. This solder paste formulation is based on a lead free platform with an organic system that serves as a carrier to produce the paste form of the solder. Calhoun clearly does not contemplate this type of conventional solder paste system when he describes the use of mere organic binder materials. Furthermore, Calhoun merely describes the mixture of conductive particles as just that – a conductive mixture. The fact that graphite and metal coated polymer particles are included in the list of preferred conductive materials is a clear indication that this substance isn't meant to be used as a solder paste, but merely as an electrical conductor.

Wasulko teaches a pre-patterned device substrate device-attach transfer tape which allows a one step mounting of adhesive patterns on a device substrate in the desired configuration for later

mount of surface mounted devices thereon. Given that previously presented arguments clearly shows that the method in Chung is not the method in the present application, the teaching of Wasulko would not apply in conjunction with Chung, Calhoun or both to give the method in the present pending claims.

Therefore, based on the arguments presented herein, independent claim 13 is allowable as being patentable over Chung in view of Calhoun and Wasulko. Furthermore, claims 14-15 and 22-27 are also patentable by virtue of their dependency on claim 13.

REQUEST FOR TELECONFERENCE

The Applicant, through the undersigned Attorney-of-Record respectfully requests a teleconference with the Examiner to resolve any remaining issues of patentability, so that this application may proceed to allowance as soon as possible. The undersigned Attorney-of-Record can be reached at 714-830-0622 from November 10, 2003-November 18, 2003 and after December 1, 2003.

REQUEST FOR ALLOWANCE

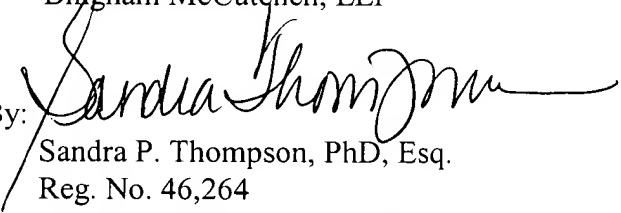
Claims 13-15 and 22-27 are pending in this application, and the Applicant respectfully requests that the Examiner reconsider all of the claims in light of the arguments presented and allow all current and pending claims.

Dated: 11/4/2003

Respectfully submitted,

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Pending Action: Response to OA filed on 11/4/03, Review for Teleconference or Next Action

We claim:

Claims 1-12 and 16-21 previously canceled.

13. (Previously Amended) A method for coupling an IC to a supporting surface comprising:
 - providing an IC;
 - providing a supporting surface to which the IC is to be mechanically and electrically bonded;
 - providing a pre-form assembly comprising a base layer and a sacrificial layer, the base layer comprising a thermosetting material or a thermoplastic material and wire or solder paste through conductors;
 - applying the pre-form assembly to either the IC or supporting surface;
 - peeling away the sacrificial layer;
 - sandwiching the base layer between the IC and the supporting surface; and
 - curing the base layer.
14. (Original) The method of claim 13 wherein providing the preform assembly comprises:
 - providing a sacrificial layer;
 - coating the sacrificial later with a release coating;
 - applying a thermosetting material on top of the release coating;
 - curing the thermosetting material to form a B-stage layer; and
 - inserting through conductors into the thermosetting material.

15. (Original) The method of claim 14 wherein the step of inserting through conductors into the thermosetting material comprises either piercing wires into the thermosetting material, or lasing or drilling and subsequently filling holes in the thermosetting material with a solder paste.
22. (Currently Amended) The method of claim 14 wherein the release coating at least partially comprises silicon, polytetrafluoroethylene Teflon[®], or graphite release agents.
23. (Currently Amended) The method of claim 13 wherein the base layer further comprises a fine mesh fiber material impregnated with ~~a thermoset~~ the thermosetting material, and the fine mesh fiber is thermally conductive.
24. (Currently Amended) The method of claim 13 wherein the base layer further comprises a fine mesh fiber material impregnated with ~~a thermoset~~ the thermosetting material and the fine mesh fiber is electrically non-conductive.
25. (Currently Amended) The method of claim 13 wherein the base layer further comprises a ~~thermoset~~ the thermosetting material intermixed with a particle filler.
26. (Previously Added) The method of claim 25 wherein the particle filler is thermally conductive.
27. (Previously Added) The method of claim 25 wherein the particle filler is electrically non-conductive.